THE WEATHER AND CIRCULATION OF FEBRUARY 1950[1]

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The general circulation of the entire Northern Hemisphere was considerably more zonal in character in February 1950 than it was during the preceding month. Comparison of mean 700-mb. charts for the 2 months (see fig. 1 of this article and corresponding article in January 1950 Monthly Weather Review) shows that most of the centers of height anomaly were smaller in magnitude in February than in January. During both months the greatest anomaly anywhere on the map was the positive center in the Bering Sea, but even this anomaly decreased from 900 feet in January to 580 feet in February. Of greater significance, perhaps, than the decrease in magnitude of this anomaly center was its motion. The centers of both the positive height anomaly and the associated anticyclone moved about a thousand miles to the northwest during the month. As a result, strong northerly flow on the east side of the High transported extremely cold Alaskan air over the relatively warm waters of the Gulf of Alaska, where a Low center quickly developed, both at sea level and aloft, in the well-known manner first described by Namias.[2]

[1] See charts I–XI, following p. 40, for analyzed climatological data for the month.

[2] J. Namias, and P. F. Clapp, "Studies of the Motion and Development of Long Waves in the Westerlies," *Journal of Meteorology*, vol. 1, No. 3, December, 1944, pp. 57–77.

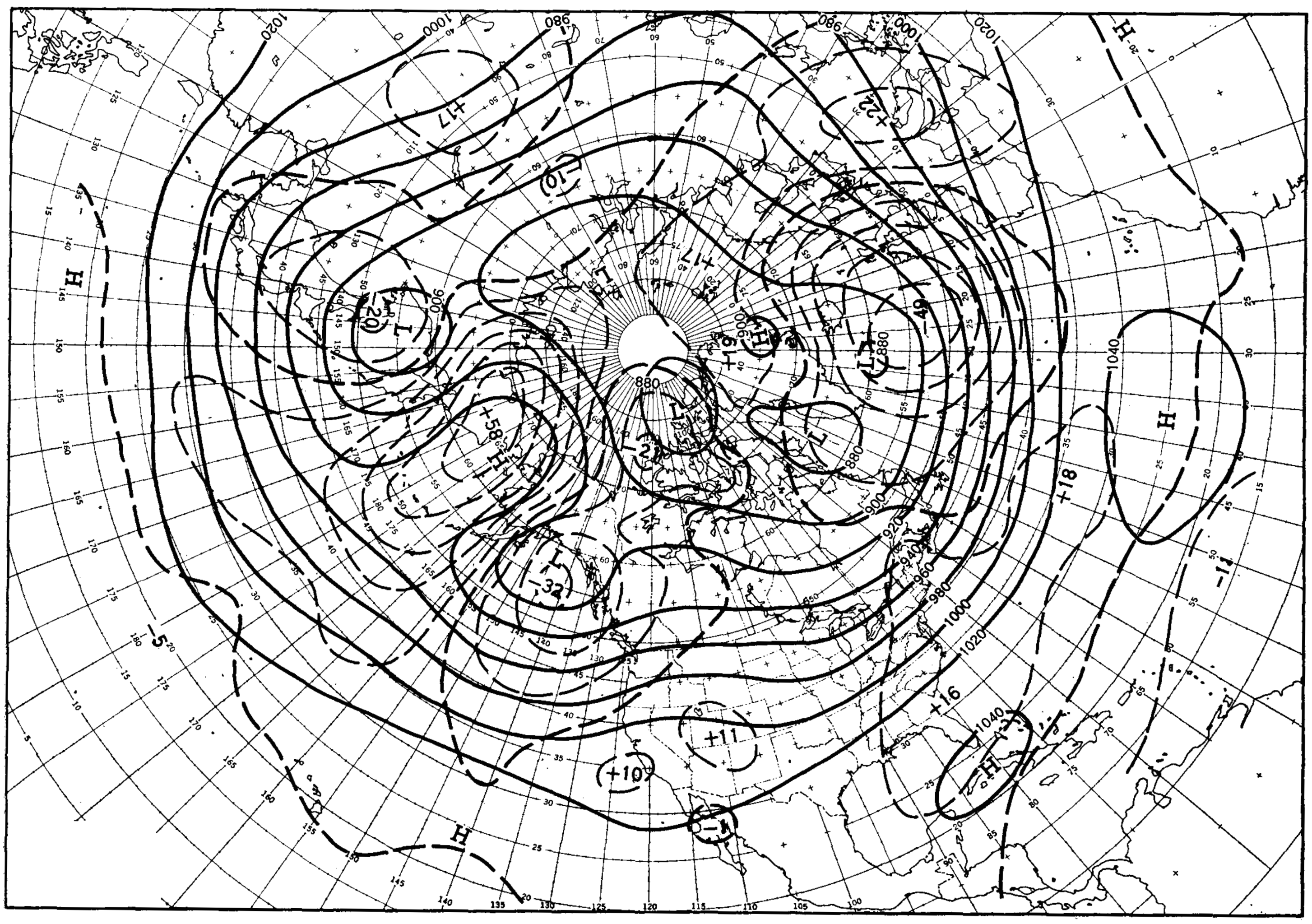


FIGURE 1.—Mean 700-mb. chart for the 30-day period January 28–February 26 inclusive. Contours at 200-foot intervals are shown by solid lines; 700-mb. height departure from normal at 100-mb. intervals by dashed lines with the zero isopleth heavier. Anomaly centers and contours are labeled in 10's of feet.

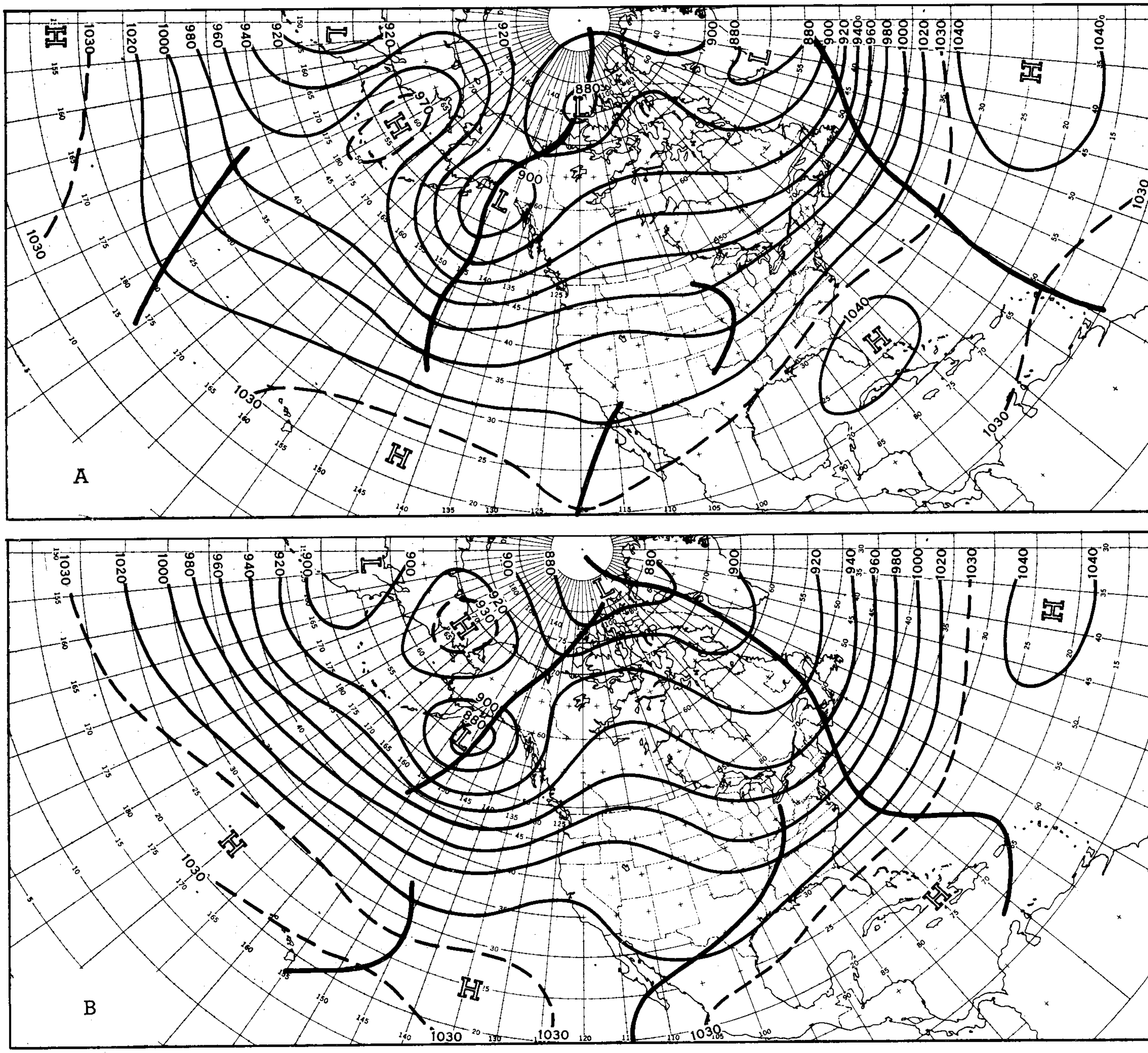


FIGURE 2.—15-day mean 700-mb. charts for (a) February 1–15, and (b) February 12–26. Contours at 200-foot intervals are shown by thin solid lines, selected intermediate contours at 100-foot intervals by dashed lines. Heavy solid lines indicate trough lines drawn through the longitudes where contours reach their minimum latitude.

In response to the formation of the Gulf of Alaska Low, the circulation pattern over North America began to undergo radical readjustment during February. In general agreement with vorticity and wave-length principles, a ridge developed in the western part of North America, and a part of the trough which had occupied this area during January moved eastward into the eastern United States. At the same time the trough which had been located in the central Atlantic in January retrograded sharply toward the east coast of North America during February, and the ridge in the eastern United States weakened considerably. The progressive nature of the deepening of the Gulf of Alaska Low, development of the western North American ridge, eastward motion of the trough in the United States, retrogression of the Atlantic trough, and weakening of the Bermuda High are all well illustrated by comparing the 15-day mean 700-mb. charts for the first and second halves of the month (fig. 2).

Thus February was a month of transition, not only in the general circulation pattern but also in the weekly surface temperature departures from normal (fig. 3).

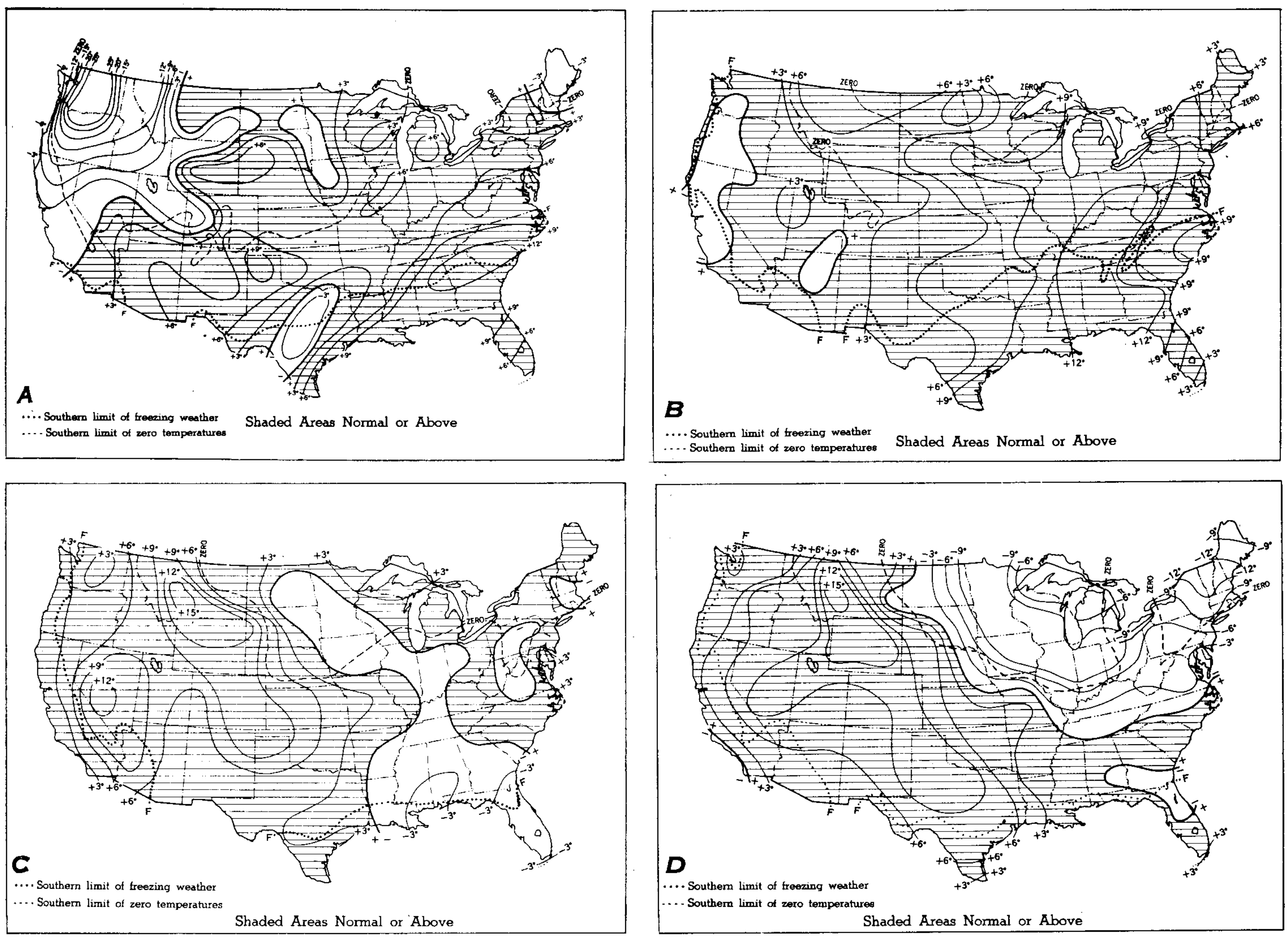


Figure 3.—Charts showing departure from normal of the weekly mean temperatures during the month of February; (a) week ending February 7, (b) week ending February 14, (c) week ending February 21, (d) week ending February 28.

The first week of the month was marked by intense cold in the northwestern part of the United States and extreme warmth in the Southeast, a continuation of the January pattern. During the second and third weeks the West became steadily warmer, as a ridge aloft developed in the area, and the East became progressively colder as the Bermuda High weakened and trough conditions intensified. By the last week of February the initial temperature and circulation patterns were completely reversed, with above-normal surface temperatures and 700-mb. heights prevailing in the Southwest while the Northeast was experiencing its coldest weather of the winter season, accompanied by considerable snow and storminess.

As a whole, during the month of February temperatures averaged above normal over most of the United States; temperatures were below normal in only three small northern border areas. (See chart I.) This predominantly mild weather was associated with above-normal 700-mb. heights in nearly all of the country and below-normal heights in the Gulf of Alaska and western Canada. (See fig. 1.) As a result of this distribution of height anomalies, and also in response to strong confluence around 45° N., 155° W., between cold Arctic air flowing from the north and warm Pacific air from the west-southwest, the upper-level westerlies blew with unusual vigor across the United States. The country was therefore flooded with mild Pacific air, and the cold polar continental air masses could not penetrate the border to any appreciable extent. The greatest positive temperature departures from normal were observed in the western Plains, where the foehn effect intensified the warmth of the Pacific air, and to a lesser extent in the Southeast, where warm maritime tropical air was mixed with the mild Pacific air.

The distribution of total precipitation during the month of February was similar in many respects to the January precipitation regime. During both months southwesterly flow just east of a mean 700-mb. trough was associated with above-normal amounts of precipitation in the Ohio and lower Mississippi valleys, while precipitation was deficient in the Southeast because of the dominance of anticyclonic conditions at all levels of the troposphere. Moreover, stronger-than-normal westerly wind components produced heavy precipitation in the extreme Northwest but created a rain-shadow east of the Rocky Mountains in both January and February. On the other hand, precipitation was considerably reduced during February in most of the northern Plains, northern Plateau, and California, as the trough conditions and below-normal 700-mb. heights which prevailed there in January were replaced by an upper-level ridge and positive height anomalies. These changes were accompanied by a northward shift of the principal cyclone track across the western part of North America, from the United States in January to Canada in February. (See charts III of Monthly Weather Review for January and February 1950.) During both months, however, several storms moved northeastward across the Mississippi and Ohio valleys and produced heavy precipitation and serious flood conditions in many parts of this area.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, February 1950

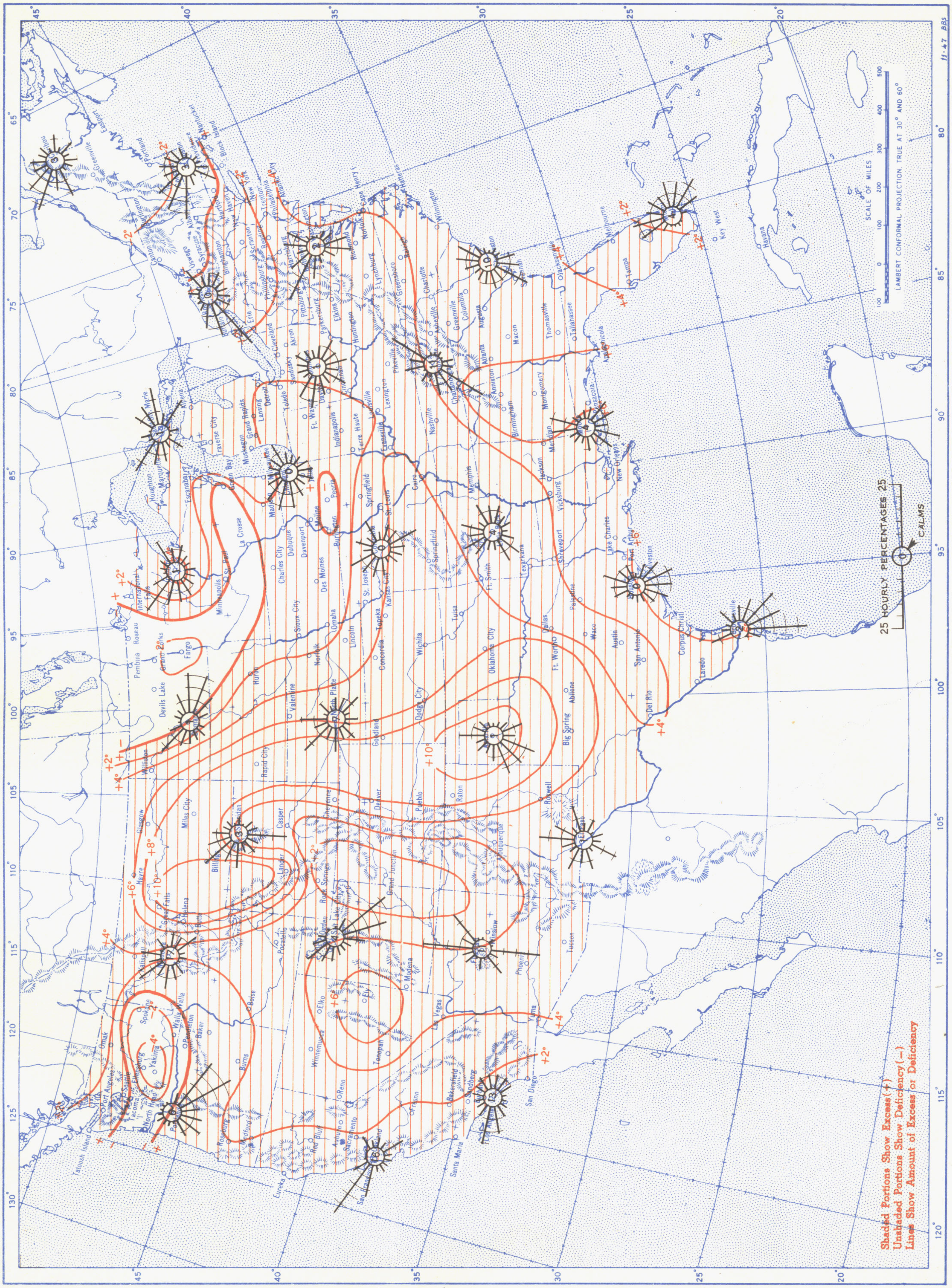
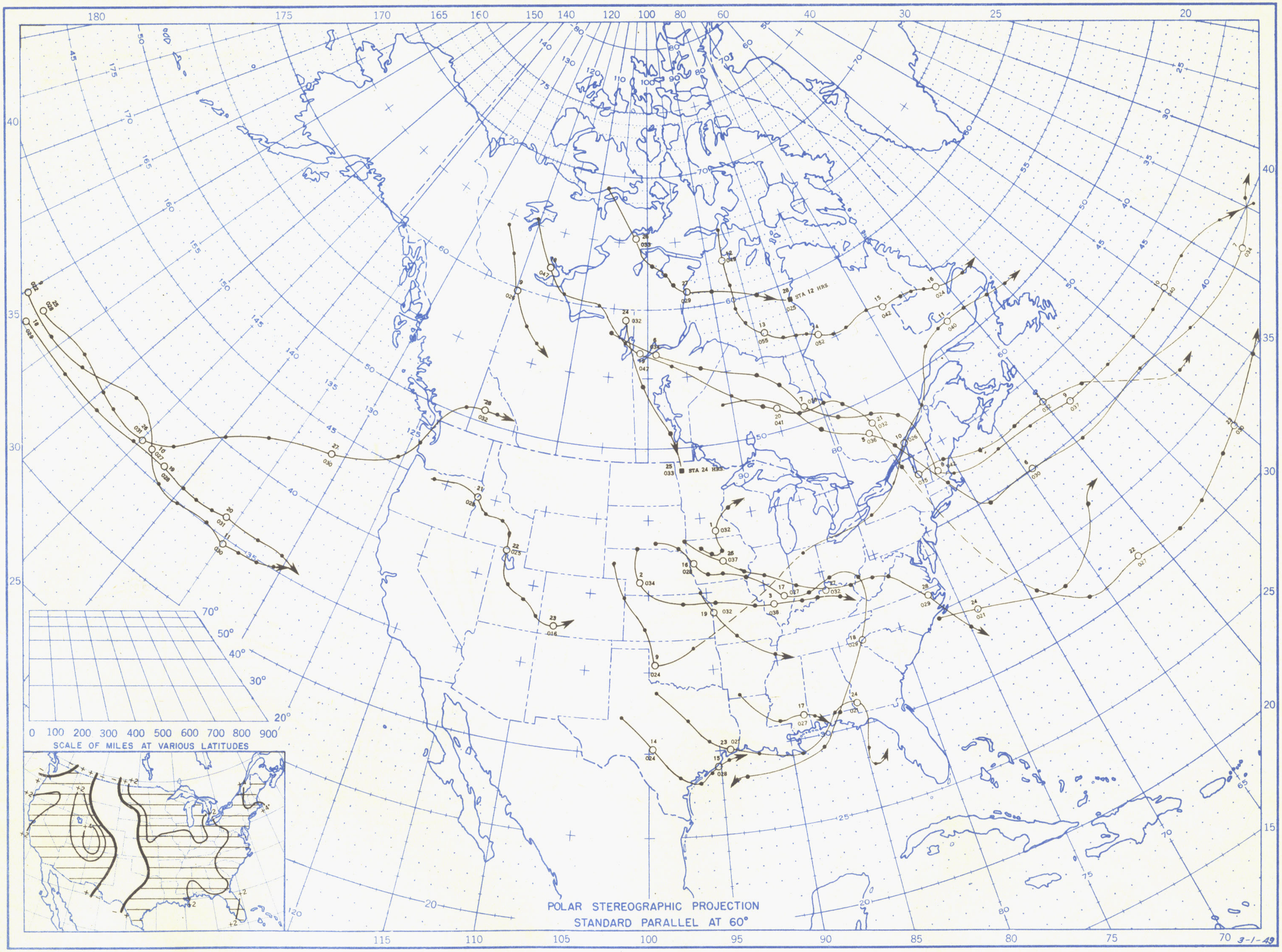
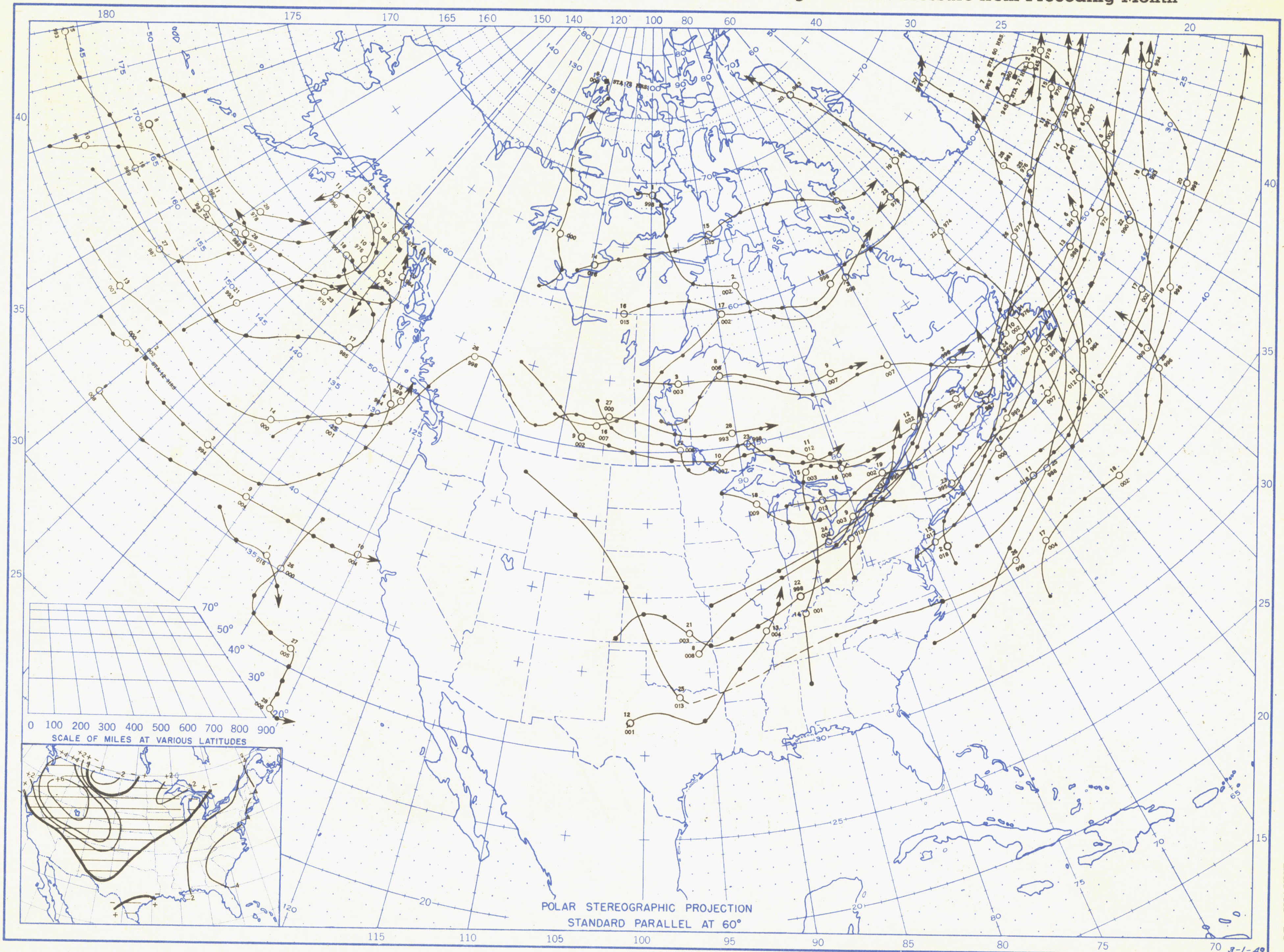


Chart II. Tracks of Centers of Anticyclones, February 1950. (Inset) Departure of Monthly Mean Pressure from Normal



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time). Dots indicate intervening 6-hourly positions. Figure above circle indicates date, and figure below, pressure to nearest millibar. Only those centers which could be identified for 24 hours or more are included.

Chart III. Tracks of Centers of Cyclones, February 1950. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time) Dots indicate intervening 6-hourly positions. Figure above circle indicates date, and figure below, pressure to nearest millibar. Only those centers which could be identified for 24 hours or more are included.

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, February 1950

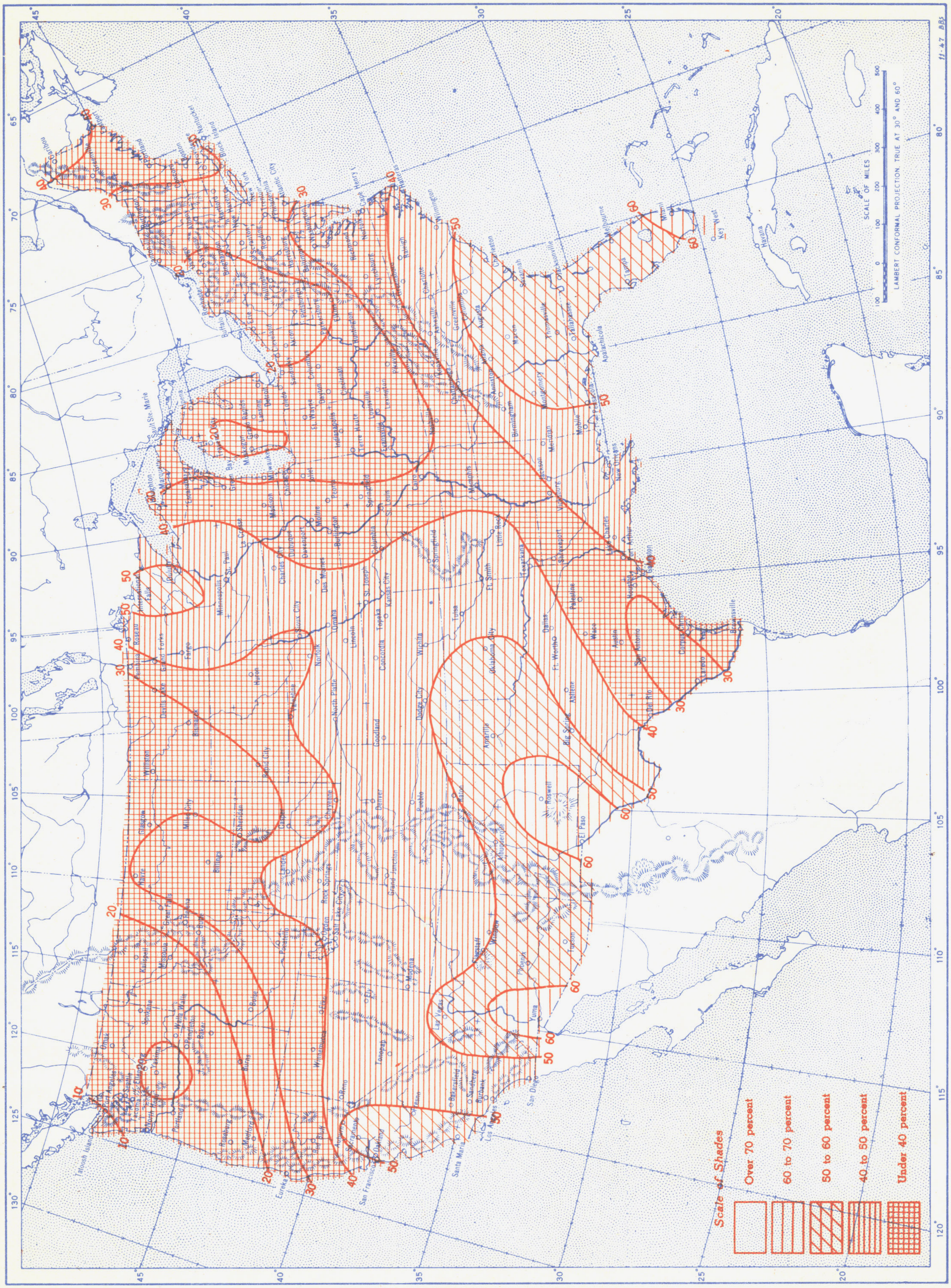


Chart V. Total Precipitation, Inches, February 1950. (Inset) Departure of Precipitation from Normal

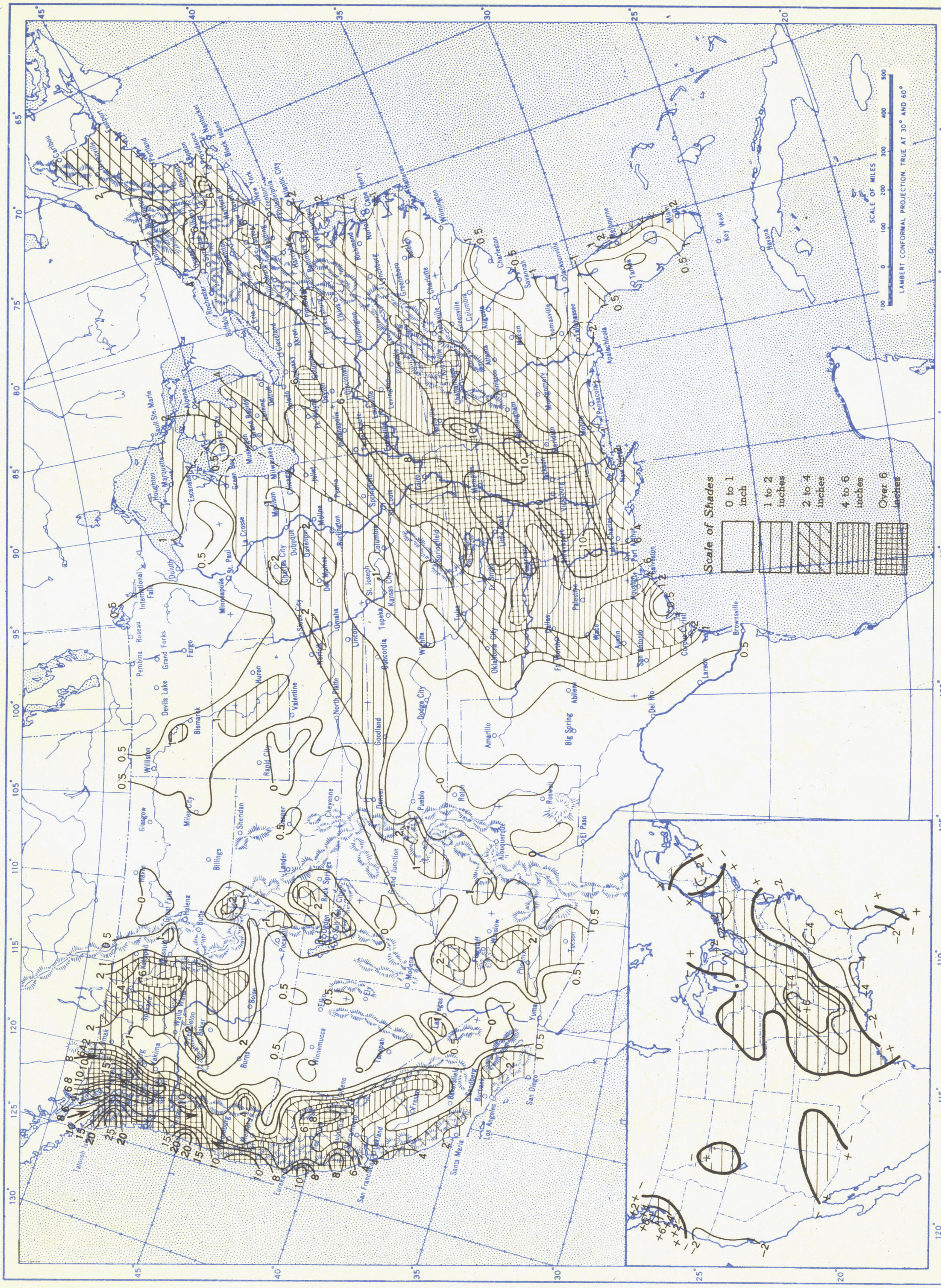


Chart VI. Mean Isobars (mb.) at Sea Level and Mean Isotherms (°F.) at Surface, February 1950

Chart VII. Total Snowfall, Inches, February 1950. (Inset) Depth of Snow on the Ground at 7:30 a.m., February 28, 1950

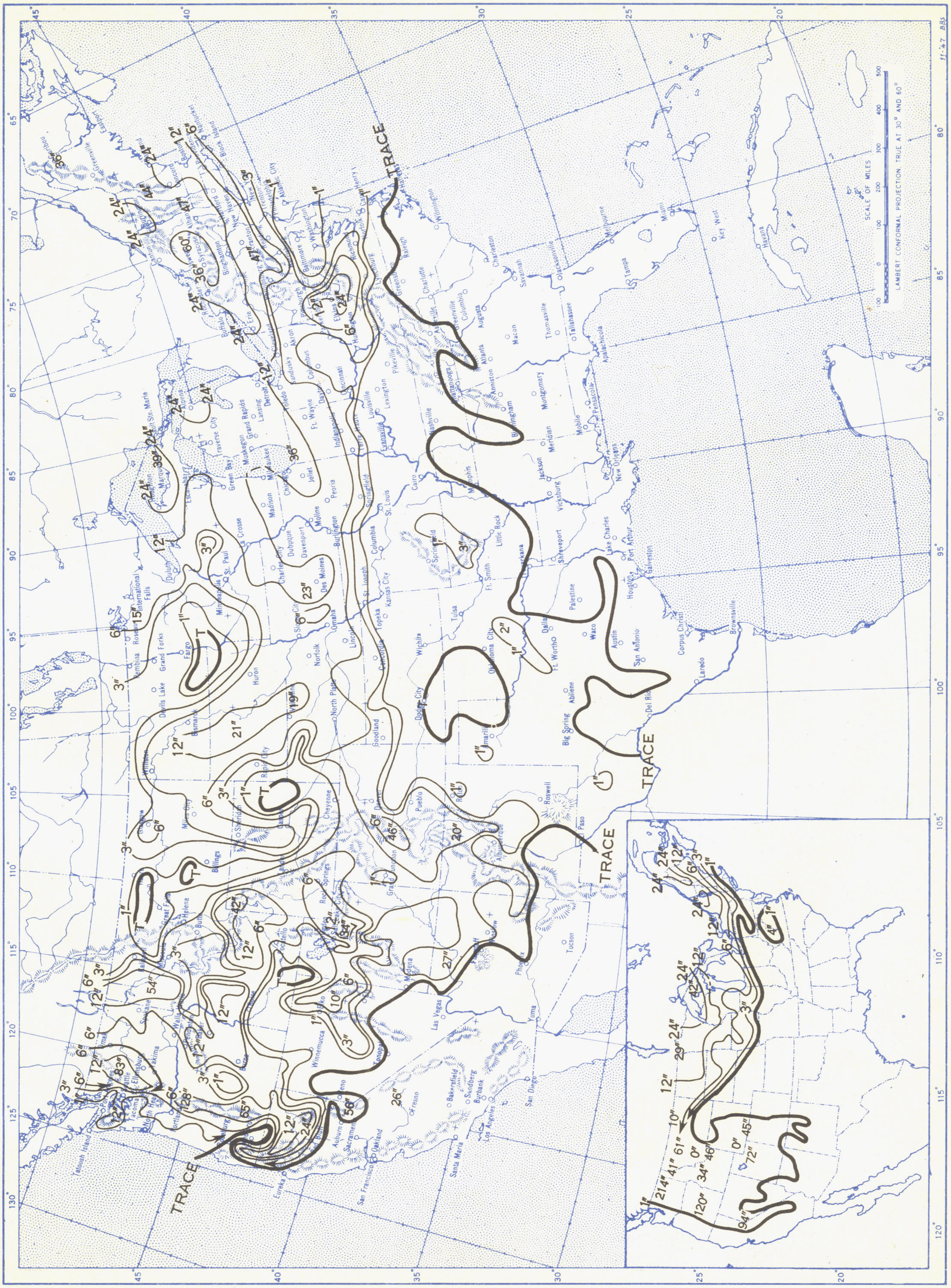
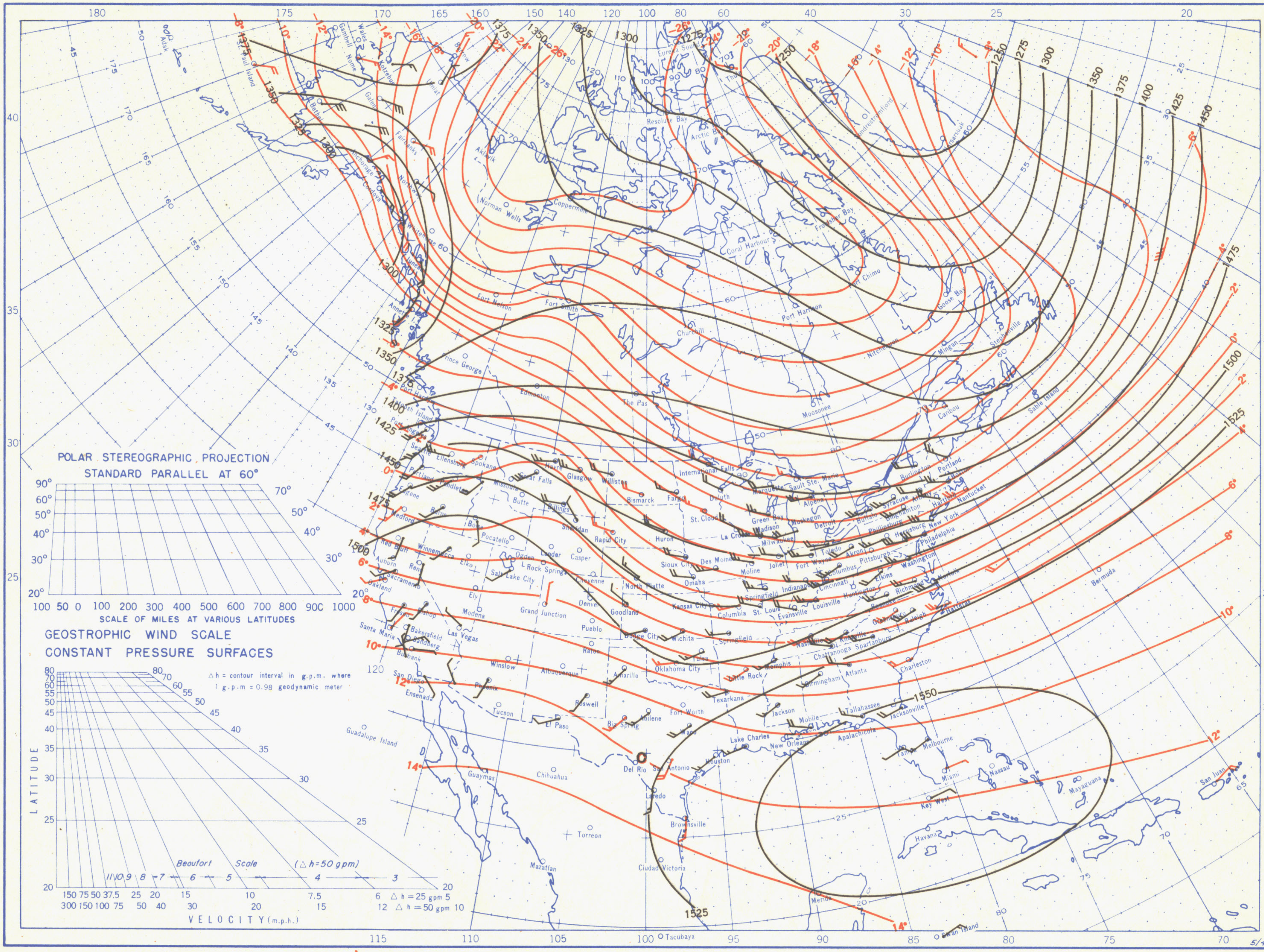
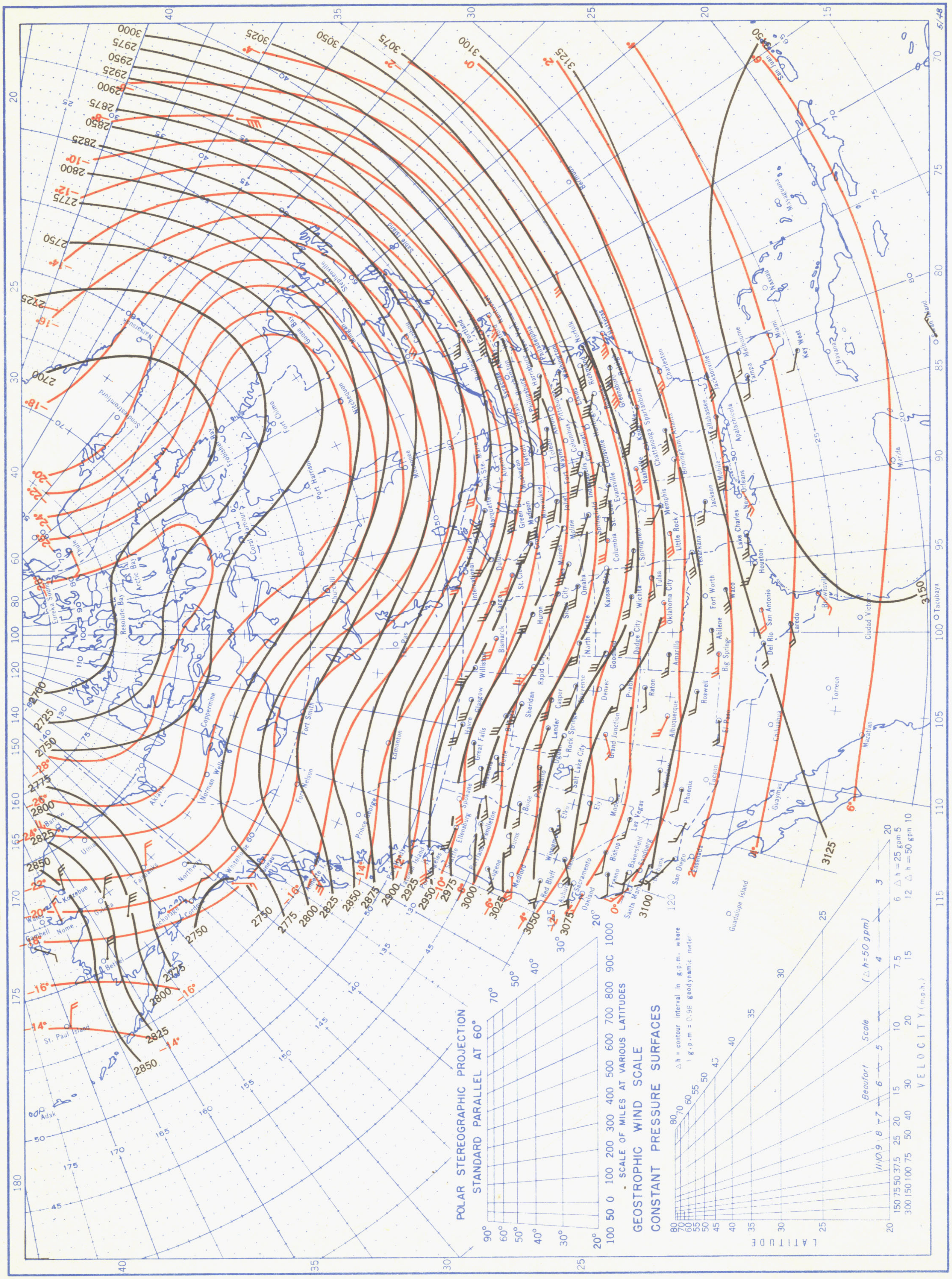


Chart VIII, February 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 850-millibar Pressure Surface, and Resultant Winds at 1,500 Meters (m. s. l.)



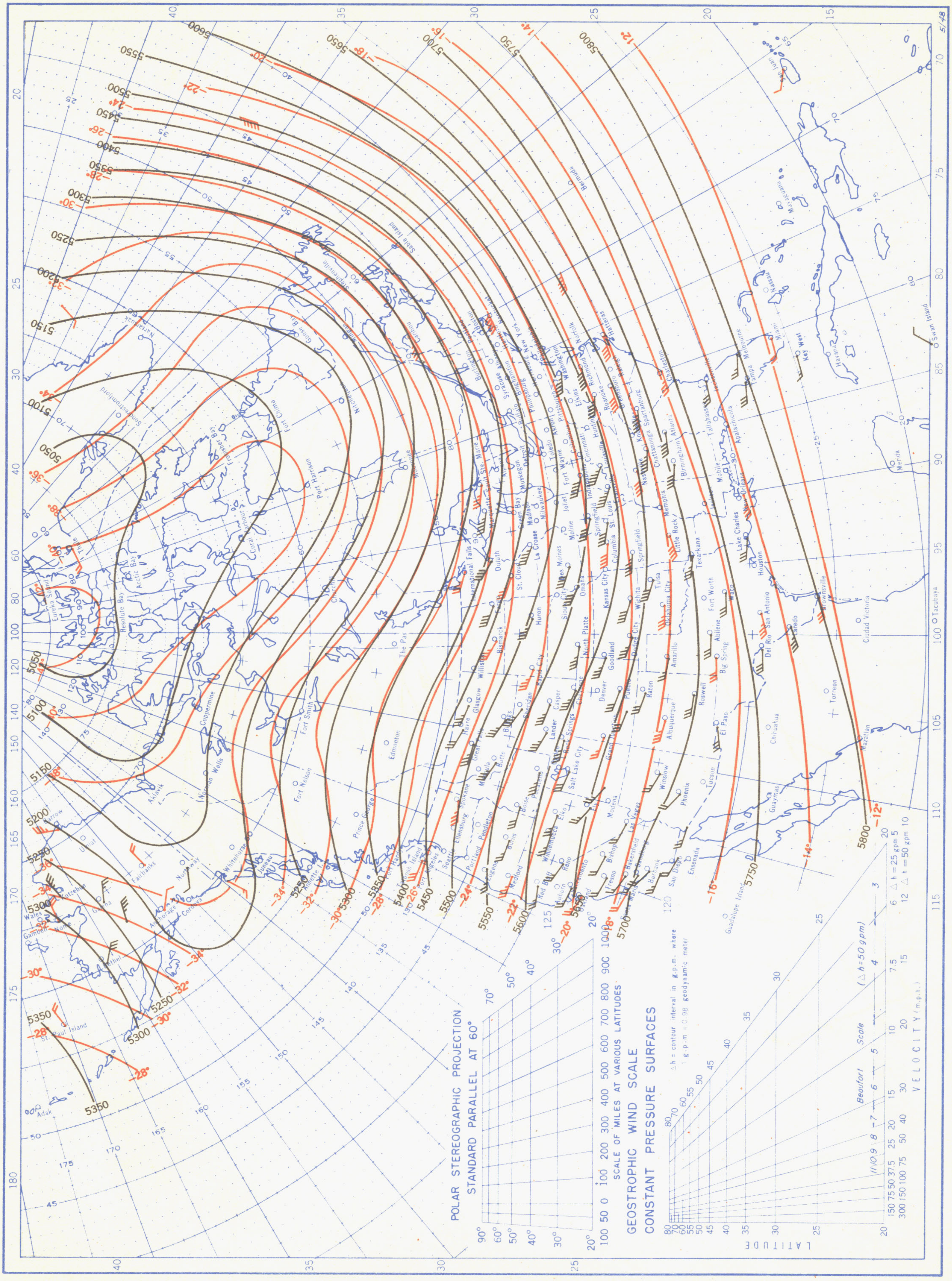
Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart IX, February 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 700-millibar Pressure Surface, and Resultant Winds at 3,000 Meters (m. s. l.)



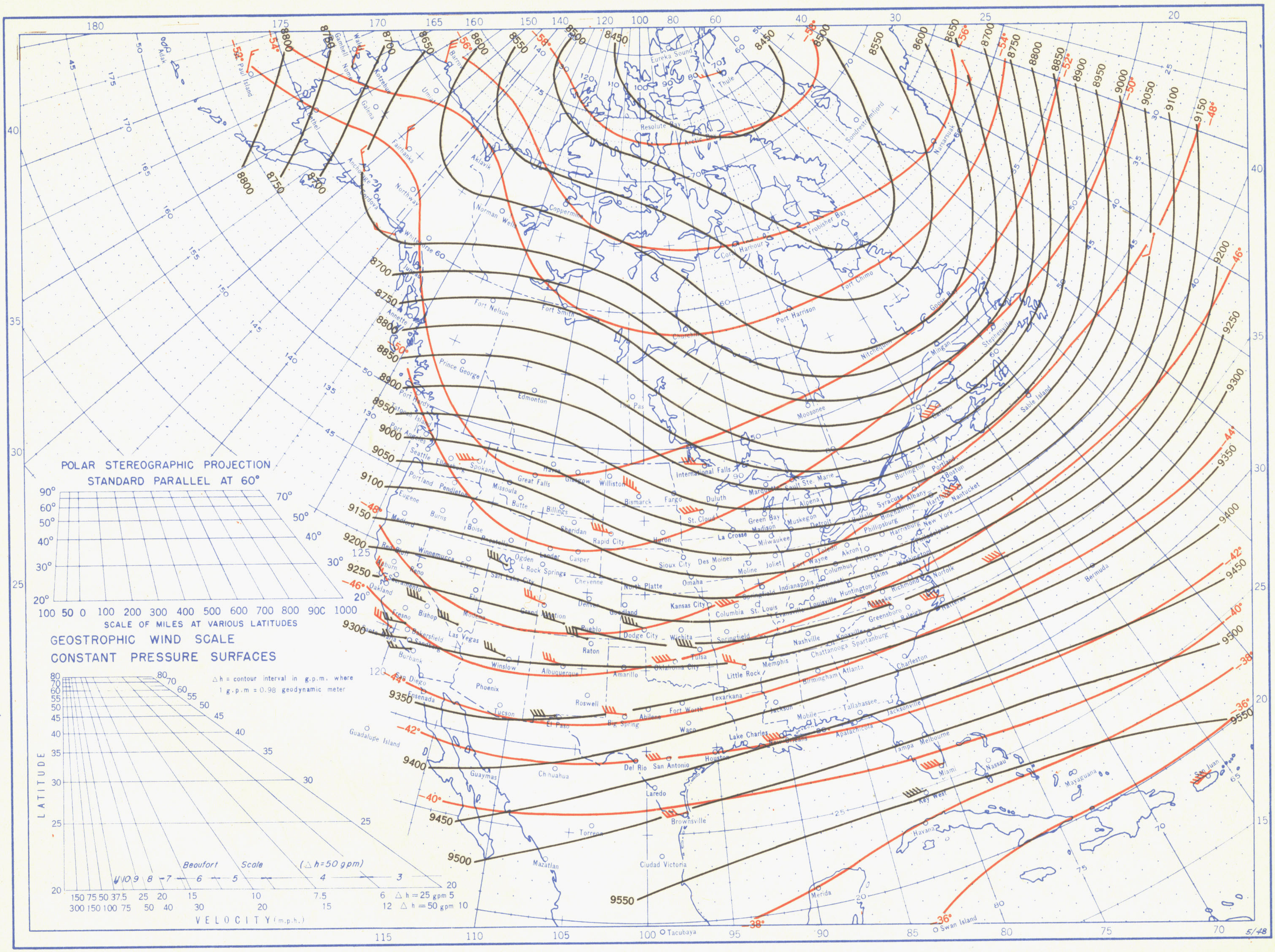
Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart X, February 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 500-millibar Pressure Surface, and Resultant Winds at 5,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.

Chart XI, February 1950. Contour Lines of Mean Dynamic Height (Geopotential) in Units of 0.98 Dynamic Meters and Mean Isotherms in Degrees Centigrade for the 300-millibar Pressure Surface, and Resultant Winds at 10,000 Meters (m. s. l.)



Contour lines and isotherms based on radiosonde observations at 0300 G. C. T. Winds indicated by black arrows based on pilot balloon observations at 2100 G. C. T.; those indicated by red arrows based on rawins taken at 0300 G. C. T.